



FACT SHEET

Module 6 Components of a Time & Space Management System

A space management system is like an insurance policy. It can provide substantial protection for a small investment. All that is required is involvement and understanding. To be effective, a space management system must be easy to use and apply to all roadway situations. A space management system helps drivers organize information into meaningful categories so decisions can be made easily and quickly. All the space management systems have an action step. Drivers must then evaluate the risk on the principles of probability (will it happen?) and consequence (what will be gained or lost?). The basis of any space management system requires good seeing habits. The goal is to make the system easy for the instructor and student to use and learn.

The following systems are used in driver education textbooks.

SIPDE Used in Responsible Driving

Search the roadway and the off-road areas for roadway, vehicle, and other user information that can help plan the path of travel at 20 to 30 seconds ahead of the vehicle.

Identify objects or conditions that could threaten the intended path of travel. Is the risk situation, a potential or immediate threat for an unwanted consequence?

Predict what threats or changes in conditions could increase or decrease the level of threat to the planned path of travel.

Decide what speed control or lane position action would reduce the threat of a collision consequence.

Execute the decision by appropriate communication, followed by a speed and/or position adjustment

IPDE Used in Drive Right

Identify problems to give meaning to what is seen. The sooner a potential or critical hazards in the roadway are identified, in the vehicle, or due to other users; the more time will be available to react safely to the critical hazard.

Predict how the potential or immediate hazard might affect the intended path of travel.

Decide upon a minimize, separate, or compromise maneuver to reduce the hazard critical to the path of travel.

Execute the decision with precision speed control, lane position and communication.

SAFE Used in License to Drive

Scan to gather as much information as possible about the complete driving scene around the vehicle.

Assess potential threats in the driving environment.

Find a way out of the situation.

Execute the decision to avoid upcoming conflict by changing speed and/or changing direction.

ABCs Used in *Drive Right* and Mottola's *Zone Control*

Alert switch is turned on by seeing a LOS POT blockage to your path of travel.

Before acting, check other zones for options.

Create time and space management, get the best speed, the best lane position, communicate.

An ***open zone*** is a space where the vehicle can be placed without a restriction to the line of sight or intended path of travel.

A ***closed zone*** is space is unavailable for vehicle placement due to a restriction in the line of sight or intended path of travel.

A ***changing zone*** is a worsening condition, an open zone changing to closed zone, or a closed zone with an additional restriction.

Reduced-risk decisions are performed by developing visual skills to make critical adjustments of speed and/or lane position into open space with adequate time for adjustments

SEE Used in the ADTSEA and some State Model Curriculum Guides

Some states have created their own acronym for a space management system. The most common is SEE.

Search the intended path of travel and space to the rear for problems and restrictions to the sightline or intended travel path.

Evaluate open spaces to front, side, and rear to determine reduced-risk adjustments for speed or lane position.

Execute reduced-risk adjustments by visually targeting new path of travel, visually check mirrors, give appropriate communication, adjust speed, then adjust lane position.

SMITH Experienced Driver System

The Smith System is a copyrighted program, developed in the 1950 time period for experienced drivers. The Smith System uses a defensive driving process to encourage visual skill redevelopment. The skills are based on the driver having basic operational skills. This organization is credited with creating the one car length for ten miles per hour following distance. But now stress a minimum of three seconds with additional time needed for weather and visibility issues.

- **Aim high** in the driver environment with the focus vision to allow more time for driver response
- **Keep you eyes moving** to search for hazards and vehicle movements around the vehicle.
- **Get the big picture** of where your vehicle is located in time and space.
- **Make sure others see you** by appropriate communication, lane position, and visibility.
- **Leave yourself an out** to reduce risk of collision from the front, sides, or rear.

VEHICLE CONTROL SKILLS

Vision

The ability to control a vehicle by using the accelerator and brake (motion control) is relatively easy for most drivers to learn. The skill of turning the steering wheel (steering control) is also quite easy to achieve for most drivers. However, 70-90% of the decisions drivers make are based upon what is seen when driving. Therefore, vision (vision control) is the most important vehicle control skill.

Driving skills should be used in the following order:

- **Vision Control**
- **Motion Control**
- **Steering Control**

When applying the skills to a maneuver such as making a right turn, the tasks would be:

- Use vision to determine speed, lane position and appropriate communication
- Use braking and acceleration as needed to maintain vehicle balance and control
- Turn the steering wheel to the new path of travel while maintaining vehicle balance.

When in a panic, drivers often reverse the procedures resulting in loss of control:

- Quickly steering in an effort to get away from the hazard
- Slamming on the brakes or accelerating hard to avoid the hazard
- Looking at the hazard rather than to the escape

Good habits for managing time and space require good visual skills. Visual functions used for driving include:

Central vision – covers about 3-5% of our visual field and is used to read and identify distinct objects. Central vision is used for targeting, reading, searching and interpreting.

Fringe vision is the area around our central vision that extends about 45 degrees. Fringe vision is used to judge depth and position and to identify reference points while driving.

Peripheral vision is conical shape around our vision fields that sees motion and color. It often gives the driver an initial warning of a changing or closed space area. Peripheral vision is strongly affected by fatigue, drugs, and speed.

LINE-OF-SIGHT

Created by Fred Mottola, Interactive Driving Systems and the National Driver Behavior Institute

The line of sight (sightline) is the unobstructed distance visible from the your driver's seat to the target area at the end of the path of travel.

The line-of-sight can be affected by:

- the vehicle's window space/obstructions
- other vehicles
- bushes/buildings
- hills, curves
- weather conditions

A clear line of sight is needed for the brain to determine speed and steering adjustments.

When the line of sight is interrupted by an obstruction, a change in speed and position are necessary to restore a clear line of sight to the target area.

The driver's goal is to maintain an open line of sight.

PATH-OF-TRAVEL

The **path-of-travel** is the space the vehicle will occupy from its present position to the targeting area. The intended path of travel is a combination of:

- targeting area
- line of sight (unobstructed view to target area)
- reference points

The path-of-travel can be affected by:

- objects in or near the roadway
- pedestrians/animals
- other vehicles
- signs, signals, and roadway markings
- traffic and road conditions
- visibility and weather conditions
- name others.....

The driver's goal is to maintain an open path-of-travel.

KNOW WHERE YOUR TIRES ARE TRACKING USING REFERENCE POINTS

Created by Fred Mottola, Interactive Driving Systems and the National Driver Behavior Institute

Experienced drivers typically have a developed sense of where their tires are tracking and how much space is available before denting a fender. New drivers lack this experience and benefit by knowing and using "reference points." Reference points tell the driver exactly where the tires are tracking. It works like this: from the driver's point of view, see some part of the vehicle as it relates to some part of the roadway. The arrow represents the driver's line of sight. It's where the driver is looking. Reference points are always seen from some point on the car to ground level.

Side Reference Points

**Know when your tires are
3-6 inches from a curb or line to the right.
When you look at the curb, pavement line, or edge
of the road, it appears to line up near the
center of the hood.**

- This is lane position 3
- Used for parking





Know when your tires are 3 feet from a curb or line to the right.

When you look at the curb, pavement line, or edge of the road, it appears to line up with the middle of the right half of the hood.

- This is lane position 1
- Side position for preparing for a right turn



Know when your tires are 3-6 inches from a curb or line to the left.

When you look at the pavement line or curb, it appears to line up about one foot in from the left edge of the hood.

- This is lane position 2
- Side position for a left turn
- Used for parking

Forward Reference Point



Know when your front bumper is even with the curb line.

When you look at the curb line, it appears to line up with the passenger side mirror.

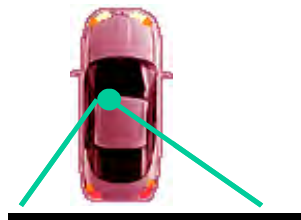
- The point when you start turning the steering wheel for a right turn
- Used as a safety stop to get a clear view of the intersection

Rear Reference Points

Know when your rear bumper is 0-6 inches from a left rear line.

When you look back, the curb or line, it appears to be in the middle of the left rear window.

- Used when backing to know where your rear bumper is



Know when your rear bumper is 0-6 inches from a right rear line.

When you look back, the curb, or line, it appears to be near the window corner post.

- Used as a pivot point to begin turning while backing around a corner

LANE POSITION OPTIONS

Created by Fred Mottola, Interactive Driving Systems and the National Driver Behavior Institute

"Move your car over a little." "Scoot over a bit." "Stay in your lane." What do these coaching words mean? By using specific coaching for lane position, new drivers will achieve success quicker.

With the use of lane positions, drivers will be able to use the total width of a travel lane. For a travel lane that is 12 feet wide, drivers will be able to have at least 6 feet of empty space to the side of your car -- extremely important space to avoid a crash. How drivers use this vacant space will be dependent upon what zone conditions exist. So, the first step is to learn how to position the vehicle to either side of a lane and how to position it in the center of the lane.

Use the lane position that gives the best line of sight and path of travel. Assigning lane position numbers or colors to the basic positions within a lane allows the new driver to move to the position quickly and can be communicated more easily than asking the student to move over a little.

LANE POSITION 1

In the center of the lane
Allows 3 feet on each side

LANE POSITION 2

0-6 inches from a line to the left

- Used for left turns, parking on the left, and to increase your line of sight

LANE POSITION 3

0-6 inches from a line to the right

- Used for parking against a curb line, and to increase your line of sight

LANE POSITION 4

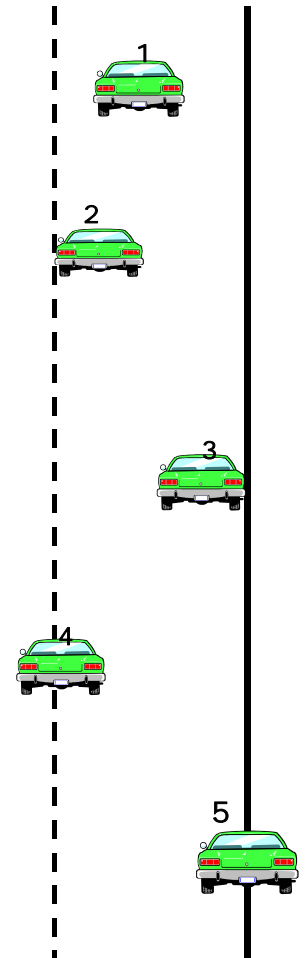
Straddling a line

- Used to move away from a hazard on the right

LANE POSITION 5

Straddling a line

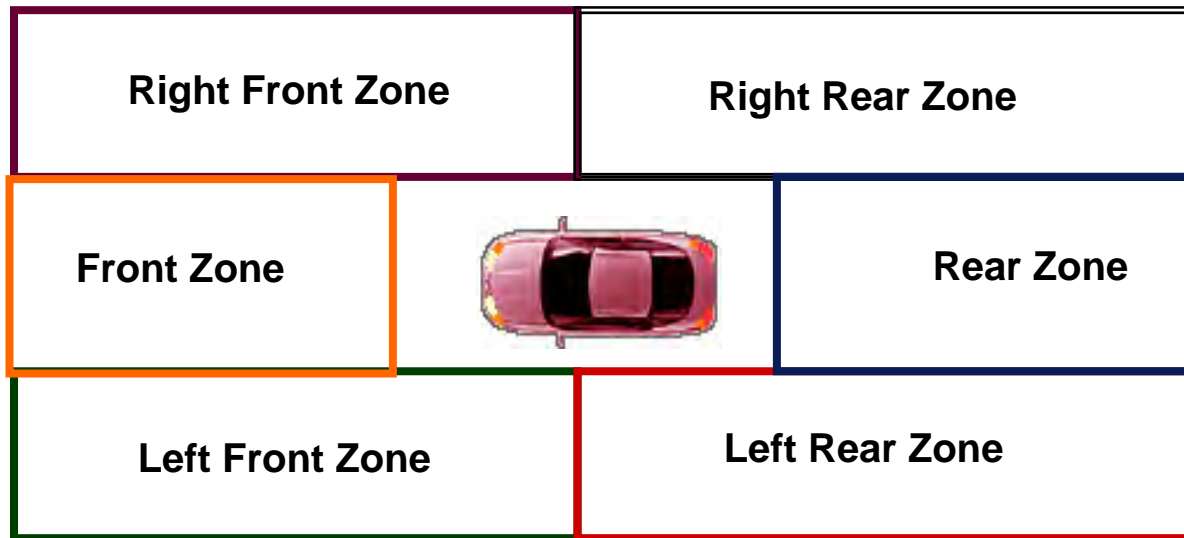
- Used to move away from a hazard on the left



MANAGING THE SIX AREAS AROUND THE VEHICLE

Created by Fred Mottola, Interactive Driving Systems, the National Institute of Driver Behavior

Managing the space around your vehicle is more effective when the space is organized into operating areas that a vehicle could occupy and the driver can control. This system, known as zones, is six areas of spaces around a vehicle that are the width of a lane and extends as far as the driver can see. These six areas represent locations and conditions that could affect a driver's path of travel, speed or communication.



These locations may be:

- **Open** (there is space in which to operate without restrictions to the line-of-sight and/or path-of-travel).
- **Closed** (the area is not available for your path of travel and/or you have a restriction to your line-of-sight)
- **Changing** (a worsening condition such as an open space changed to a closed line-of-sight and path-of-travel.)

When a space becomes closed, that should trigger the driver to check the other spaces to get all the information before making a decision. The most frequent other space to check after seeing a closed space is the rear zone. After seeing a change, the driver gets the information needed to get the best speed and path of travel control option.

A closed side zone exists when you the driver can't see at least 8 seconds of empty space to the side or there is not an available path of travel to the side.

- An oncoming car or truck is a closed left front travel path.
- A car traveling in the left mirror blind space area is a closed left rear travel path.
- A motorcycle in the right mirror blind space area is a closed right rear travel path.
- A truck following closely is a closed rear sightline and travel path.
- A bicyclist to the right is a closed front right travel path.

Set a goal to keep empty spaces around the vehicle as much as possible.

THE ORDERLY VISUAL SEARCH PROCESS

Don't Look Down!

Too often a driver is told "don't look down, look far ahead." To some drivers, especially novice drivers, 10 feet in front of the bumper is "far ahead."

The Visual Search Process

The first space management skill a driver must develop is an effective visual search. To search effectively, a new driver needs to know where to look, when, how, and what to look for, and how to evaluate if a potential problem could be a high risk or reduced risk situation. A visual search process is an organized pattern of focused eye movements scanning the path of travel and driving environment searching in a regular sequence for critical areas or conditions.

An organized searching process starts from the visual lead area, which is 20-30 seconds from the front of the vehicle. Keeping the eyes focused farther away from the vehicle will allow the driver more time to make decisions. Targeting in the center of the path of travel at least 20 to 30 seconds ahead is critical to gaining as much information as possible from the driving scene.

There are three forward search patterns that should continually be evaluated to gain control over the intended path of travel. To have effective control over the front zones drivers must also keep awareness over the rear zone which becomes the fourth search pattern. A systematic search can help drivers develop an effective searching pattern into habit. Such searching habits will provide opportunities to be mentally ahead of the vehicle and eliminate high stress, high risk situations.

One example of a search pattern is:

- Look to the target area
- Search and evaluate the front zones in the 12-15 second range
- Search driveways and intersections for possible changes to the line of sight/path of travel
- Check the rearview mirror
- Evaluate the 4-6 second range before entering that space
- Look again to the 12-15 second range
- Check the 4-6 second range
- Check the rearview mirror
- Check speedometer and gauges

Speed and Vision

As speed increases, the amount of information needed to maintain car position and detect movement also increases. The ability of peripheral vision to detect the motion of other objects is reduced when speed increases. Minor adjustments to the steering wheel occur in shorter time frames, causing significant or exaggerated vehicle movements. With higher speeds, the visual lead needs to increase to give:

- more time to gather information.
- increased the peripheral vision giving the driver time to detect motion and decide an adequate response.
- more space between other vehicles and your vehicle, so abrupt responses are held to a minimum.

WHERE AND HOW TO SEARCH

Where to search involves moving the eyes from near (inside and outside the vehicle - as close as the dashboard and mirrors) to 20 to 30 seconds into the target area to identify objects or conditions that could increase the level of risk.

Searching/Look To The Sides: When approach any place where other cars, people or animals may cross the intended path, look to both sides. Don't rely on traffic lights or stop signs. Always watch out for other drivers—they may run the light. Check to the sides for speed and lane position options. Identify the best speed and lane position options for existing conditions.

Searching/Look Behind: Check the traffic behind every time the foot goes to the brake. Know if somebody is tailgating, coming up too fast or trying to pass. Most rear-end collisions are caused by vehicles following too closely.

Searching/Blind Spots: These are areas of the vehicle that are not visible in the mirrors. Enhanced Mirror (BGE) Settings help reduce the blind spot areas. Before making any move to the side, quickly turn the head to see if the blind spot is clear. Also avoid driving in someone else's blind spot. It's as important for other drivers to see you as for you to see them.

Searching/Identify: Scan the road ahead for potential hazards such as a vehicle, pedestrian, animal or situation that could force you to slow down, speed up or turn. Make more aggressive searches when there are line-of-sight restrictions that may conceal a pedestrian or a bicyclist. A driver can look in, under and around parked cars for feet, wheels, shadows, and movement. When done at the proper distance, pedestrians and bicyclist can be seen before they create a surprise.

The immediate path is the space within 4-6 seconds of travel time. It is very important to acquire the skills to search all three ranges: the target area, the 12-15 second range, and the immediate path. The immediate path should only require an update of the conditions originally detected when evaluating the travel path. By looking only at the immediate path before searching to the target area, three or four seconds would be quickly consumed and the driver is not able to get mentally ahead of the vehicle.

Extended Visual Search Categories

- Highway
- Structure
- Surface
- Features
- Atmosphere
- Intersections
- Traffic controls
- Signs
- Signals
- Marking
- Intersections/interchanges
- Motor vehicles
- Type
- Characteristics
- Non-motorized Users
- Bicyclists
- Pedestrians
- Skaters, skateboarders
- Animals

SEARCHING RANGES

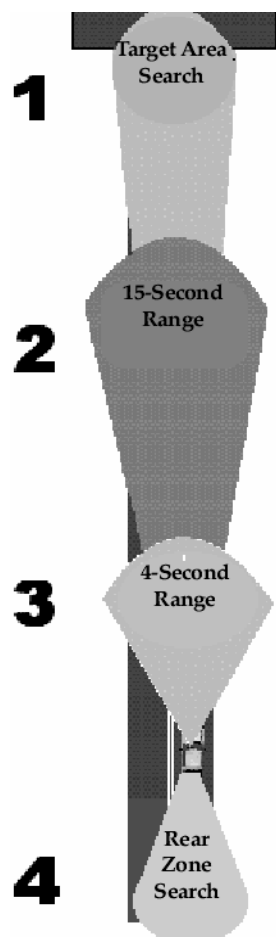
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Searching for Open Zones: A Zone is open if it has space to operate without restrictions to the Line-of-Sight and Path-of-Travel, or closed (not available for you to use), or changing (open zone that is closing, or closed zone changing for the worse). Maintain open space on at least one side into which the vehicle can be steered. A front zone is closed when you can't see at least 12 seconds ahead, you don't have at least 12 seconds of available path of travel; or you do not have at least 4 seconds of following time when traveling behind another vehicle.

Searching involves monitoring the immediate path of travel, four to eight seconds ahead, 12-15 seconds ahead, to the target area, the instrument panel, and timely mirror usage to monitor traffic to the sides and rear.

How and when to search involves timing and direction of the search pattern. When to search requires consciously looking to determine conditions all around the vehicle before initiating any maneuver.

Searching 20 - 30 seconds ahead/ Target Area Range - Research has demonstrated that the typical driver's search is only four to five seconds ahead of their vehicle. However, the only way an individual can effectively assess a safe travel path is to identify possible line of sight changes well in advance and determine appropriate speed or position adjustments. By looking as far ahead (at least 20 to 30 seconds) as possible, identifying an intended path of travel/ target area and adjusting speed to the visual field, the driver has more time and space to identify potential problems. Early identification and assessment of objects and/or conditions provides time to adjust speed and/or position with awareness of adjacent, oncoming, and/or following vehicles.



Searching 12-15 seconds ahead - Searching 12-15 seconds ahead of the vehicle is the minimum range that enables you to plan your actions to gain the best speed selection, lane positioning, and communications for the best control of your targeted path. Look for anything that will affect your speed, path of travel or need to communicate with other drivers.

Searching 4-6 Second ahead Immediate Range - Search 4 seconds ahead to the immediate path of travel to ensure you have an open line of sight and path of travel. Re-evaluate your 4-6 second path before entering it. The 4 seconds ahead represents the following interval and the 6 seconds provide a safe stopping zone under most conditions.

Searching Behind

Check your mirrors every time your foot goes to the brake. You'll know if somebody is tailgating, coming up too fast or trying to pass. Most rear-end collisions are caused by vehicles following too closely.

Searching Blind Spots

- These are areas of your vehicle that are not visible in your mirrors.
- Enhanced Mirror settings reduce the blind spot areas.
- Before you make any move to the side, quickly turn your head to see if your blind spot is clear.

- Avoid driving in someone else's blind spot. It's as important for other drivers to see you as for you to see them.

Searching into Turns

Turns and curves reduce your line of sight. Adjust speed before entering the turn. Before turning, turn your head and look into the turn. Turn before turning the steering wheel. Look through the turn to the exit. If you can't see the exit of the turn – Slow Down!

Searching Intersections

When approaching an intersection search 45 degrees to the front, left, right. While stopped, search 90 degrees – left/front/right. The sequence depends upon the conditions in the intersection. Search for line of sight and/or path of travel restrictions.

Determine the point of no return (you will continue into the intersection) when you are 2 seconds from the intersection. Your speed will determine the distance from the intersection. The slower you approach an intersection, the more time you will have to decide if you can enter the intersection or you must stop.

Where to Stop

The pavement will tell you where the legal stop must occur: the stop line, the crosswalk, or before entering the intersection. Use a staggered stop (15 feet from the legal or safety stop) to give space for turning traffic entering the lane beside you, as shown in the picture.



What to search for requires forethought and planning - To be effective when searching the highway and traffic scene, the driver must be looking for specific kinds of information. Simply stated, "The eyes don't tell the brain what it sees—the brain tells the eyes what to look for." If the brain is not programmed to look for specific information, the eyes simply scan the scene and primarily respond to the more colorful and/or moving objects. Since the brain is limited in the amount of information it can process at any one time, a more effective method is to search for and classify information by category. Searching can be made easier by classifying topics into one of four groups:

1. Roadway Features

- road and lane width
- lane markings
- roadway surface
- shoulder condition and slope
- curb type and height
- hills and curves
- intersections and interchanges
- areas of limited visibility
- location and type of structures adjacent to the roadway.

2. Signs, signals, and markings: Warning, regulatory, directional, and informational.

3. Motorized vehicles: Cars, trucks, tractor-trailer rigs, buses, motor homes, motorcycles, construction/farm tractors, and other slow moving equipment and horse drawn equipment.

4. **Non-motorized highway users:** Pedestrians, bicyclists, and animals.

CONTROLLING SPACE TO THE FRONT AND REAR

There are three ways to control space to the front. Time arrival to a given point by

1. adjusting speed
2. placement of the vehicle when stopping
3. controlling speed while in motion.

Following Time

Following too closely is a primary causation of traffic collisions among all drivers in Montana (and the nation). Time is needed to react to danger to avoid a collision. A reasonable following time may change as a result of road conditions, weather conditions, fatigue, drugs, inattention or traffic conditions and even vehicles of different weights affect the ability to stop.

All time and distance relationships are designed for the best driving conditions:

- **A 2-second following time** provides the driver time to steer out of problem areas at all posted speeds on a dry surface and brake out of problems at speeds under 35 mph.
- **A 3-second following time** provides the driver time to steer out of problem areas at all posted speeds on dry surfaces and brake out of problems at speeds to 45 mph. At highway speeds even a 3-second following time is inadequate when braking to a stop to avoid striking a fixed object if the vehicle following behind is a tractor-trailer rig. In such instances a stopping zone of 10 to 15 seconds may be required.)
- **A 4-second following time** provides the driver time to steer out of problems at all posted speeds on dry surfaces and brake out of problems at speeds up to 70 mph. It is important to note that many passenger car tires are not designed to steer out of problem areas at speeds beyond 75 mph. At speeds over 75 mph, high speed rated tires are required due to sidewall flexion at higher speeds and turning movements.

Three-Second Following Time

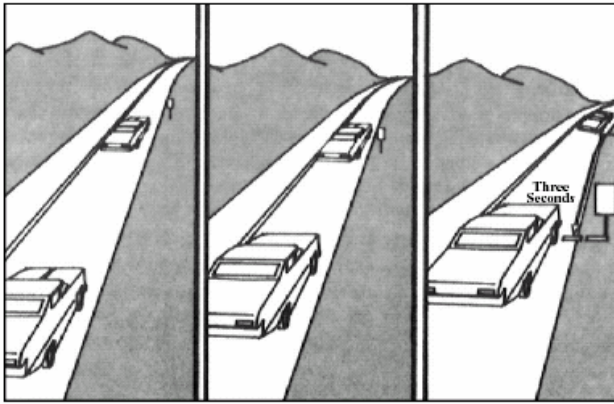
Gives the most control over the space directly in front of the vehicle. Reduce risk by creating as much space as possible. Adequate distance has many advantages:

- more time to adjust to traffic conditions
- reduced surprises
- more space in which to maneuver the vehicle
- control of the space ahead of the vehicle

The three-second following time is the minimum following time under good driving conditions.

It works like this:

- Choose a fixed object such as a sign or tree ahead of the car in front of you.
- As the car ahead passes the object, count off four seconds (one thousand- one, one-thousand-two, one- thousand-three).
- If it takes at least three seconds before you pass the object, you have enough distance for a sudden stop.
- In bad weather, the three seconds should be increased several times to give an extra margin of safety.



The larger the vehicle in front of you, the more following distance you will need.

Stopped at a Traffic Light

When you are the first driver at a red traffic light, take two seconds to ensure the intersection is open by delaying moving until after you have searched the left, front, and right zones.

Stopping Behind a Vehicle

When stopping behind another vehicle, a safe driving habit is to leave enough distance from the vehicle in front so that the rear tires are seen touching the pavement. This good habit may keep you from hitting the vehicle in front of you if someone crashes into the rear of your vehicle. It also allows room to go around a stalled vehicle without backing and causing a traffic hazard.

Controlling Space to the Rear

There are options for controlling your rear zones: Check the rear view mirror:

- after seeing a change to conditions ahead
- before and after braking action
- while stopped in traffic
- before and after making turns
- before and after making a lane change

MAKING LANE POSITION CHOICES

When space to the front is clear. When traveling in lane position one, search 20 to 30 seconds ahead along the planned path of travel and 12 to 15 seconds to the left and right frontal areas to identify planned and alternate paths of travel. Continually reassess the immediate path four (4) to eight (8) seconds ahead. If an object or condition adjacent to the projected path of travel reduces space to either side, check to the rear and side and move to position two or three as appropriate.

When more than one object or condition adjacent to path of travel poses a possible threat.

Having identified that the planned path of travel is open, determine which object or condition poses the greater risk and decide on change of speed and/or position appropriate to the situation. Depending on which object represents the more serious consequences; a reduction in speed and movement to lane position two or three is typically sufficient.

When the planned path of travel is closed, but alternate paths are open.

Having identified alternate paths of travel 12 to 15 seconds ahead and maintained an area into which the vehicle can be steered into at least one side, more time is provided to reassess traffic to the side(s) and rear and communicate intentions prior to adjusting position and speed.

When the planned path of travel is closed and there is no alternate path.

Having determined when searching 20 to 30 seconds ahead that there is no alternate path available 12 to 15 seconds ahead, immediately check to the side(s) and rear to detect the presence, location, size, and speed of any following vehicles. If present, flash brake lights to alert the following driver and begin to apply the brakes. Attempt to maintain forward motion while opening up the space ahead. If the distance ahead cannot be increased, brake to a stop while maintaining a gap to the rear.

When the planned path of travel is open, but threatening objects or conditions exist on both sides.

When there are threatening objects or conditions to both sides of the path of travel, reduce speed, cover brake while in the area of reduced space, and maintain lane position one.

When there is no following traffic.

The absence of traffic to the rear provides the maximum level of control to the rear. It permits quicker and more abrupt changes of speed and/or direction in response to changes in ongoing and oncoming traffic or other roadway users.

Selecting a Safe Gap

Knowing how much space there is between you and other vehicles is critical. The ability to judge a safe gap is necessary any time a driver is joining with traffic or passing through an intersection. Enough time is needed to make speed and steering adjustments.

The vehicle approaching from the left will be the most hazardous, since it will enter your path of travel before vehicles traveling from the right.

Different size gaps are needed for different maneuvers. To judge a gap, estimate the speed and closing rate of the on-coming vehicles. A larger gap is needed to turn right than to cross an intersection. A left turn is more dangerous than a right turn because the vehicle is in the intersection for a longer period of time.

From a stopped position, to pass through an intersection with traffic moving at 30 mph the gap needed is:

- 5-6 seconds to cross a two lane roadway without interfering with traffic flow (look for vehicles almost a block away)
- 7-8 seconds to cross a four lane intersection
- 7-8 seconds to turn left (look for vehicles more than a block away)
- 6-7 seconds to turn right (look for vehicles at least a block away)
- When changing lanes look for a 4-6 second gap
- For a 3 point turn look for a 20-30 second gap

VEHICLE DISTANCE TRAVELED PER SECOND

Vehicles travel at 1.467 feet per second. To determine how many feet a vehicle is traveling at a given speed two methods for calculating result in almost the same answer.

Formula #1

$$\begin{aligned} 5,280 \text{ feet} \div 60 \text{ min} \div 60 \text{ Sec} &= 1.467 \text{ feet traveled per second} \\ 1.467 \times 50\text{mph} &= 73.3 \text{ feet per second} \end{aligned}$$

Formula #2 (For a more simplified calculation, but not precise, multiply speed by 1.5 feet per second)

$$1.50 \times 50\text{mph} = 75 \text{ feet per second}$$

Formula #3 (for the easier calculation)

Take the speed, divide by 2, add the result back to the original speed.

$$\begin{aligned} 50\text{mph} \div 2 &= 25 \\ 25 + 50 &= 75 \text{ feet per second} \end{aligned}$$

Knowing how fast the vehicle is traveling can help drivers understand the limits of their ability to react and the vehicle to respond.

DRIVER RESPONSE TIME

Drivers need sufficient time to see a hazard, determine a safe response and time to take the correct action.

Perception time is the amount of time it takes for you to see a hazard. **Reaction time** is the time it takes for you to act after you saw the hazard.

The average reaction time is 3/4 second. The hands can respond quicker than the feet.

- Simple reaction time: the average is .75—ranges from .5 to 2.0 seconds
- Complex reaction time: the average is 2.5—ranges from 2.0 to 7.0 seconds

Factors Affecting Response Time

Perception time can be affected by: distractions, inattention, poor visibility, line-of-sight restrictions, etc.

Reaction time can be affected by: fatigue, illness, medications, alcohol, age, etc.

Examples of response times:

2 seconds on dry surfaces

- steer out of problem areas at all speeds
- brake out of problem areas at speeds under 35 mph

3 seconds on dry surfaces

- steer out of problem areas at all speeds
- brake out of problem areas at speeds under 45 mph

4 seconds on dry surfaces

- steer out of problem areas at all speeds
- brake out of problem areas at speeds up to 70 mph

Cut reaction time by covering the brake when a possible conflict is seen. Covering the brake is accomplished by holding the foot over the brake pedal.

Most passenger car tires are not designed to steer out of problem areas at speeds over 75 mph. High speed rated tires are required because of sidewall flexion at high speeds and turning movements

REDUCED RISK DECISION MAKING

When driving, 50-60 decisions are made per mile. Those decisions are based upon the ability to see and identify potential hazards. As traffic conditions are evaluated, the driver must be able to accurately predict

- If the hazard is moving toward you or away from you?
- If the traffic light is a stale green?
- If the zone will be open or closed?
- What lane position should you be in?
- Where will the other driver go?
- Is there more than one possible action?
- Where would your escape route be?

- Where will the point of conflict occur?
- Will the pedestrian enter the roadway.
- Is there is sufficient traction?
- How fast is the vehicle traveling
- What other possible decisions could be made?

PRECISION DRIVER ACTIONS

Once a prediction is made, the decision must be made on the action you will take to avoid the hazard. Your goal is to perform the action with smooth precision. Drivers have three actions available and more than one action may be needed.

1. Communicate

To be effective, communication must be clear and early enough for others to perceive and react upon.

Communication techniques include:

- signals (turning, backing, hazards)
- brake light (flash, slowing, stopping)
- lane position (space management, turning intent)
- horn (a light tap to warn, increase eye contact)
- head lights (visibility, hazards)
- hand signals (never intentionally offend)
- other?

2. Change Speed

- path of travel is open—maintain, increase, or decrease speed
- path of travel is changing—cover brake, off accelerator
- path of travel is closing—off accelerator, squeeze brake
- path of travel is closed—controlled braking
- other?

3. Change Direction—some times the safest action is to take another route.

- move to a different lane position to gain more space
- change lanes
- turn onto another street
- other?

New conditions and situations are always present when driving. A driver must constantly question the present conditions. What speed selection feels most comfortable for each situation? What is the legal speed limit? What should the lane or lane position be? What is a good speed selection for this situation? What would be a high risk or poor speed selection, with little to gain? Each situation is different with changing conditions.

The speed and lane position selected are usually based upon the legal limitations, the destination, and what is comfortable for the driver. Whatever the choices for speed and position, the space management system relies on looking for conditions that could cause less control over **line of sight**, and/or **targeting area**, and/or **path of travel**. Watch for changes in the space areas around your vehicle.

Watching for slight changes, making minor adjustments for the best speed control and lane position, and using effective communication enables a driver to be prepared for the actions of others.